**MOTOROLA INC.**

May 28, 1993

Ms. Donna Searcy
Secretary
Federal Communication Commission
1919 M Street, N.W., Room 222
Washington, DC 20554

Reference: ET Docket No. 92-100
Gen. Docket No. 90-314

Dear Ms. Searcy:

On May 25 and 26, 1993 representatives of Motorola met with Commission staff to discuss a channel plan for 900 MHz Narrowband PCS. A copy of written ex parte material used is attached. Meetings were held with:

Dr. Brian Fontes
Office of Chairman Quello

Mr. Byron Marchant
Office of Commissioner Barrett

Mr. Randy Coleman
Office of Commissioner Duggan

Dr. Thomas Stanley and Staff
Office of Engineering and Technology

Mr. John Williams
Office of Plans and Policy.

Regards,

Michael D. Kennedy
Director
Regulatory Relations

MDK:amdes

Attachment

Motorola Inc.

## The Case for 150 kHz Channel Pairs for High Speed Wide Area Data Systems

There is a market need for higher speed wide area data. 20 million data users expected by year 2000.

Spectrum does not exist nor is proposed by the FCC to enable wide area data rates greater than 38 kb/s.

Broadband PCS licensed operators may not initially offer data services in the rush to be voice competitors.

The FCC has recommended solutions at 1.9 GHz for on site/campus higher data rate usage but has not answered the need for wide area.

Motorola's band plan allows Narrowband PCS spectrum to be used for Advanced Messaging Services that the FCC supports, while enabling higher speed data (132 kb/s) services.

We propose three, 150 kHz channels for higher speed data and 31 Advanced Messaging Service channels using the Narrowband PCS spectrum.

150 kHz channel pairs at 900 MHz will help seed the market for services not possible today. We would hope that the Broadband PCS licensed operators would offer 1 Mb/s or greater thus realizing the next step in wide area data.

J.L. 5/25/93-c

# THE CASE FOR 150 kHz CHANNEL PAIRS FOR HIGH SPEED WIDE AREA DATA SYSTEMS

5/24/93

## The issue:

Today's local area computer networks run anywhere from 256 kb/s to over 10 Mb/s. One only needs to look at these networks to see the applications that are enabled by higher speeds. These same capabilities such as FAX capability, interactive document annotation, large file transfer, video, etc. are all desired on a wide area tetherless basis. However spectrum does not exist to enable the services. The FCC has suggested unlicensed spectrum at 1.91-1.93 GHz for on site or campus service but has not addressed the need for wide area coverage. Various marketing studies have indicated that there could be 20 million users of wide area data systems by the year 2000. These users are segmented into various categories all requiring different amounts of data per day as well as different delivery delays. Systems in place today and future systems (i.e. Cellular Digital Packet Data) only allow up to 19.2 kb/s which is far from what is required to enable these 20 million users.

The new 1.8 GHz licensees might offer high speed data, but there will be a rush to compete with today's cellular operators for voice services. These new voice services will be digital, but there is little chance that high speed data will be offered for years, if at all. The choice of channel access mechanisms might even preclude high speed data (CDMA vs. TDMA). However, if data is in fact offered, we would hope it is several megabits/second to enable yet another set of market offerings and be complementary to our suggested 150 kHz channels pairs at 900 MHz.

## The proposed solution:

Motorola is recommending that the FCC allocate 900 kHz of the 3 MHz Narrowband PCS spectrum to high speed data services and 2.1 MHz for Advanced Messaging Services. The spectrum in question is part of the PCS docket, 90-314 (ET docket 92-100). The frequency bands are 901-902 MHz, 930-931 MHz, and 940-941 MHz.

The industry has agreed that this spectrum is ideally suited for advanced messaging, which is asymmetrical in nature. That is, the amount of information delivered from the base station to the

subscriber device (talk out) is greater than that returned from each subscriber to the base (talk in). The 50 kHz channelization proposed by the FCC will allow for data speeds in excess of 38 kb/s. Motorola has proposed that these channels be paired with 12.5 kHz "talk in" channels taking advantage of the asymmetrical nature of these advanced messaging services to conserve spectrum. The 901-902 MHz band does not have high power transmitters in the adjacent bands. The 901 to 902 MHz band can then be used strictly for device "talk in" thus this band will be "quiet" and allow for low cost systems and subscriber devices due to the lack of desensitization of the talk in receivers.

Using this plan the FCC can also accommodate higher speed symmetrical data applications. While Motorola applauds the FCC for this move to 50 kHz channels, we feel that the FCC could go further. In our reply comments of Jan. 8, 1993, we indicated the need for yet higher speed data, and that the 3 MHz in question could accommodate more than just AMS. The Motorola band plan suggested 3, nationwide 150 kHz pairs. We further suggested that the talk in channels be placed in the 901-902 MHz segment for the same reasons as explained above for AMS.

There is ample spectrum to enable 3, 150 kHz channels pairs as well as 31, 50 kHz/12.5 kHz channel pairs. There is also 13, 12.5 kHz channels in our plan for existing operators to obtain and overlay AMS on existing systems. It should be noted that 900 kHz (3, 150 kHz pairs) of spectrum is not adequate for speeds above 132 kb/s. In the future we will need more bandwidth to allow for higher speeds and this spectrum will be found at higher and higher frequencies. Technology will someday solve the problem for vehicular use since today the higher frequencies do not allow for roaming portable devices. For now, however, the 900 MHz band segments should be considered as the next step.

However the FCC must impose restrictions that these 150 kHz pairs be used for higher speed data and not just create an unlevel playing field relative to the 50 kHz license holders by allowing the segments be split into 50 kHz (or less) channels. This can be done by specifying that the service be "high speed data services with a minimum rate of 132 kb/s". We submit that the asymmetrical and symmetrical applications differ greatly and can both be accommodated.

Aggregation of 50 kHz channels in the secondary market has been suggested by some. While this is certainly possible, it would not force the use of this valuable spectrum for higher speed data and would most likely be used for multiple-channel AMS

## Emerging U.S. Spectrum Availability: Conceptual Matrix for Data Services

| "Raw" data speeds | On Site/Campus Spectrum Solution | Wide Area Spectrum Solution |
|---|---|---|
| Slow speed data (Up to 38 kb/s) (19.2 kb/s in 25 kHz channels)<br><br>Paging, slow speed data applications, Advanced Messaging Services. | | |
| High speed data (Up to 132 kb/s)<br><br>File transfer of 10,000 character files, limited motion video, etc. Interactive document annotation. | | |
| Very high speed data (Up to 1 Mb/s)<br><br>File transfer of 500,000 character files, video, limited real-time network interaction. | | |
| Very high speed data (Up to 10 Mb/s)<br><br>True real time network interaction. Full motion video | | |

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Motorola Inc.

## Emerging U.S. Spectrum Availability: Today's Data Offerings

| "Raw" data speeds | On Site/Campus Spectrum Solution | Wide Area Spectrum Solution |
|---|---|---|
| Slow speed data<br>(Up to 38 kb/s)<br>(19.2 kb/s in 25 kHz channels)<br><br>Paging, slow speed data applications, Advanced Messaging Services. | ISM bands<br><br>Some PLMRS spectrum | •RCC Paging<br>•EMBARC/MTEL<br>•RAM/Bell South<br>•Ardis<br>•Circuit switched cellular<br>•Cellular digital packet data |
| High speed data<br>(Up to 132 kb/s)<br><br>File transfer of 10,000 character files, limited motion video, etc. Interactive document annotation. | ISM bands | *Spectrum does not exist* |
| Very high speed data<br>(Up to 1 Mb/s)<br><br>File transfer of 500,000 character files, video, limited real-time network interaction. | ISM bands | *Spectrum does not exist* |
| Very high speed data<br>(Up to 10 Mb/s)<br><br>True real time network interaction. Full motion video | Motorola Altair product at 18 GHz. | *Spectrum does not exist* |

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## Emerging U.S. Spectrum Availability: Possible Solutions for Data Services

| "Raw" data speeds | On Site/Campus Spectrum Solution | Wide Area Spectrum Solution |
|---|---|---|
| Slow speed data (Up to 38 kb/s) (19.2 kb/s in 25 kHz channel)<br><br>Paging, slow speed data applications, Advanced Messaging Services. | Unlicensed or "User" PCS at 1.9 GHz solves sharing amongst users using an "etiquette".<br><br>ISM bands | Narrowband PCS at 900 MHz offers expansion room for paging, slow speed data services, and Advanced Messaging Services.<br><br>50 kHz channels paired with 12.5 kHz talk out enables services with spectrum reuse. |
| High speed data (Up to 132 kb/s)<br><br>File transfer of 10,000 character files, limited motion video, etc. Interactive document annotation. | Unlicensed or "User" PCS at 1.9 GHz solves sharing amongst users using an etiquette.<br><br>ISM bands | *Is not explicitly part of any docket!*<br><br>3-150 kHz channel pairs at 900 MHz would be the perfect next step for symmetrical data applications. |
| Very high speed data (Up to 1 Mb/s)<br><br>File transfer of 500,000 character files, video, limited real-time network interaction. | Unlicensed or "User" PCS at 1.9 GHz solves sharing amongst users using an etiquette.<br><br>ISM bands | *Is not explicitly part of any docket!*<br><br>It is our hope that licensed PCS operators at 2 GHz will offer this service. |
| Very high speed data (Up to 10 Mb/s)<br><br>True real time network interaction. Full motion video | Possible in ISM bands but difficult in unlicensed PCS if 20 MHz allocation shared with voice.<br><br>Motorola Altair product at 18 GHz. | *Is not explicitly part of any docket!*<br><br>Technology will have to solve wide area problem using freq. above 5 GHz. |

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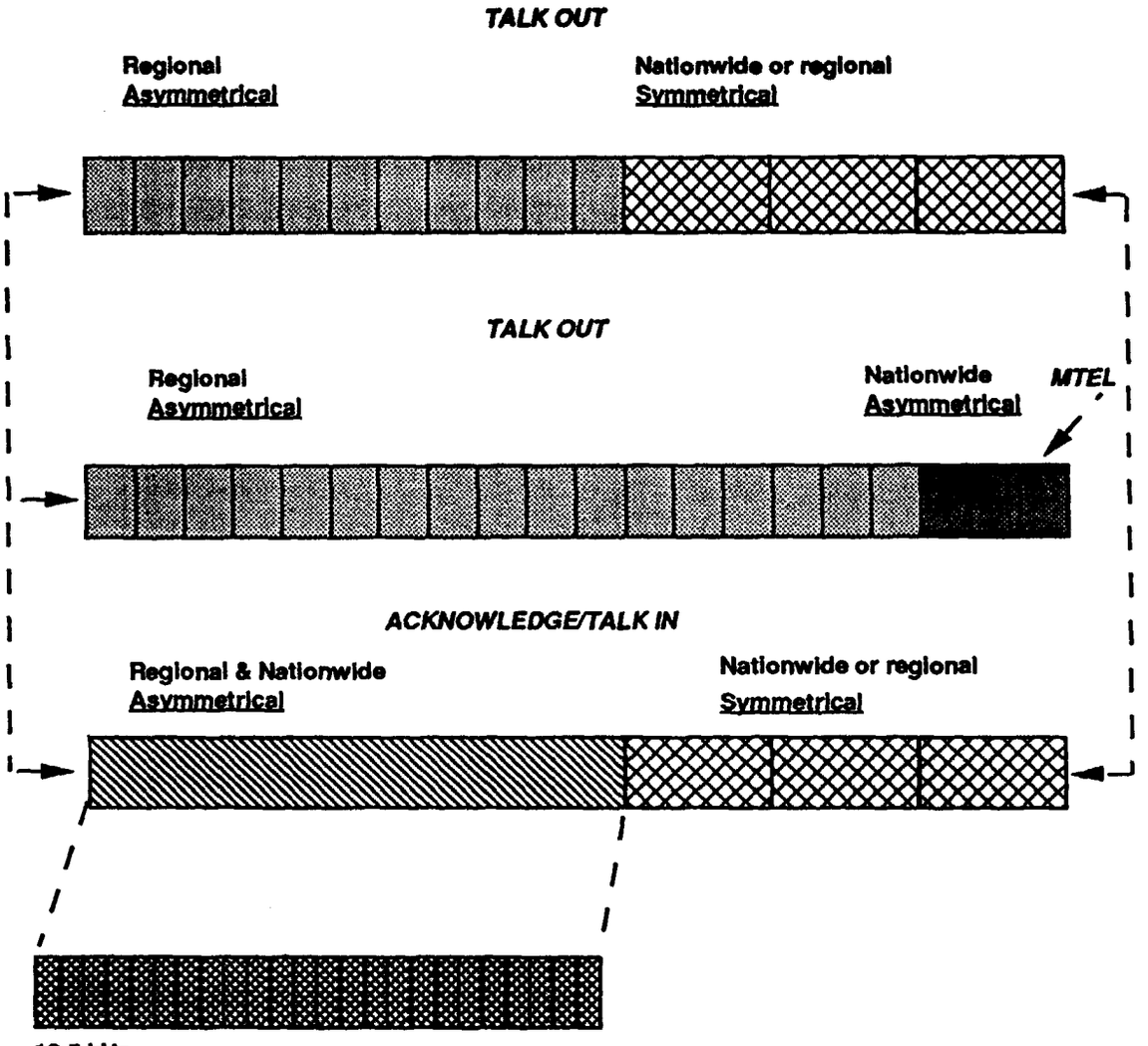
# MOTOROLA SUGGESTED BAND PLAN FOR NARROWBAND PCS




12.5 kHz
Channels
All 50 KHz licensees at 930-931 and 940-941 MHz automatically receive one of these talk in channels.

## 940-941 MHz.

3, 150 kHz channels paired with 901 MHz channels

11, 50 kHz channels paired with 901 (12.5 kHz pieces) MHz channels

## 930-931 MHz.

20, 50 kHz. channels paired with 901 (12.5 kHz pieces) MHz channels

## 901-902 MHz.

44, 12.5 kHz. channels
31 automatic pairing with talk out,
13 available for existing systems.

3, 150 kHz channels paired with 940 MHz channels

JL 5/25/93